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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/542,721

09/26/2005

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EXAMINER

VELASQUEZ, VANESSA T

ART UNIT

PAPER NUMBER

1793

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/542,721	<b>Applicant(s)</b> NG ET AL.	
	<b>Examiner</b> Vanessa Velasquez	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Supplemental Office Action***

This supplemental Office action is a substitute for the Office action mailed March 11, 2008.

### ***Status of Claims***

In the Office action mailed March 11, 2008, claims 9-21 were objected to as being in improper form for containing multiple dependencies and were accordingly not treated on the merits. These objections are withdrawn in view of claims submitted July 20, 2005. Accordingly, claims 1-21 are presented for examination and are treated on the merits in this supplemental Office action.

### ***Previous Objection to the Specification***

The previous objection to the abstract for not commencing on a separate sheet is withdrawn in view of the abstract filed July 20, 2005.

### ***Priority***

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been received and placed of record in the file.

### ***Information Disclosure Statement***

The information disclosure statement filed on July 20, 2005 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed.

Neither the abstracts nor the full disclosures of AU656228 and AU647669 have been provided. Applicant is further reminded that international search reports by themselves are not considered. However, the Examiner acknowledges that the references cited therein have been listed separately in the IDS and were therefore considered.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Floyd et al. (US 5,498,277) in view of Teller et al. (US 4,968,661).

Regarding claims 1-4, Floyd teaches a process for smelting iron source material to produce metallic iron and slag. The method involves using a top-submerged lance to introduce fuel/reductant and oxygen-containing gas into a molten bath containing a slag phase; adding to the bath iron material, additional reductant, and flux, thereby generating CO and H<sub>2</sub>; modifying the rates of injection of the oxygen-containing gas and fuel/reductant to produce a sufficient reducing environment; and post-combusting gases produced above the bath from the smelting process (Floyd, col. 8, lines 43-63). The iron source material may be iron ore (Floyd, col. 3, lines 57-60), which consists of iron oxides such as hematite and magnetite. In the step pertaining to modifying the rates of injection, the oxygen-containing gas has an oxygen content of about 40 vol.% to 100 vol.% (Floyd, col. 8, lines 64-66).

Floyd fails to teach that the oxygen to fuel/reductant stoichiometry is in excess of 60 wt%. However, Teller teaches that for complete or substantially complete combustion of carbon-containing fuels, oxygen must be added in excess (Teller, col. 1, lines 66-67 to col. 2, lines 1-2). Teller further teaches that the amount of excess oxygen added in a combustion reaction depends on, among other factors, the type of fuel being used (Teller, col. 2, lines 5-8). Solid fuels, in particular, may require oxygen in excess of more than 50% (Teller, col. 2, lines 15-18). Therefore, it would be obvious to one of ordinary skill in the art at the time of the invention to optimize the amount of excess oxygen needed, as taught by Teller, in the combustion reaction of Floyd in order to conserve fuel, lower costs, and/or increase the efficacy of the smelting process.

Regarding claims 5 and 6, the additional reductant comprises coal (Floyd, col. 8, line 52). The fuel/reductants may be coal, fuel oil, natural gas, liquefied petroleum gas, or a combination thereof (Floyd, col. 9, lines 5-8).

Regarding claims 7 and 8, post-combustion may be in excess of 0.2, but may also be as high as 1.0 (Floyd, col. 3, lines 25-29).

Regarding claim 9, the fuel/reductant may be coal in particulate form, fuel oil, natural gas, or LPG (Floyd, col. 2, lines 22-24).

Regarding claims 10-12, a carrier gas comprising nitrogen, oxygen-enriched air, or oxygen is used to introduce fuel comprising particulate coal into the combustion chamber (Floyd, col. 2, lines 22-30).

Regarding claims 13 and 14, the additional reductant is preferably coal (Floyd, col. 3, line 45), And it is provided at a rate of 20% to 60% by weight of the iron-containing source material (Floyd, col. 2, lines 45-48).

Regarding claim 15, the flux may be lime or silica (Floyd, col. 2, line 49).

Regarding claim 16, smelting is carried out at temperatures ranging from about 1350°C to 1500°C (Floyd, col. 2, lines 55-58).

Regarding claims 17-19, during post-combustion, air or oxygen-enriched air is blown over the surface of the slag bath or reducing region (Floyd, col. 3, lines 7-15). Floyd does not explicitly teach splashing of slag droplets for taking up heat energy in the post-combustion zone. However, the splashing of droplets and heat take-up would be expected to occur, as the air flowing through the lance and onto the bath surface would be expected to disturb the molten surface locally so as to create droplets ready to absorb heat in the chamber.

Regarding claims 20-21, the iron-containing source material may be in lump or particulate form (Floyd, col. 3, lines 39-41) and may comprise iron ore, pellets, fines, sands, residues, scale, steel plant flue dust, ferrous scrap, and high iron slag (Floyd, col. 3, lines 57-60).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vanessa Velasquez whose telephone number is

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(571)270-3587. The examiner can normally be reached on Monday-Friday 8:30 AM-6:00 PM ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached at 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/  
Supervisory Patent Examiner, Art  
Unit 1793

/Vanessa Velasquez/  
Examiner, Art Unit 1793